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PREVENTION OF RHEUMATIC FEVER AND BACTERIAL ENDOCARDITIS THROUGH CONTROL OF STREPTOCOCCAL INFECTIONS*

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Rheumatic fever is a recurrent disease which in most instances can be prevented. Since both the initial and recurrent attacks of the disease are precipitated by infections with Group A streptococci, prevention of rheumatic fever and rheumatic heart disease depends upon the control of streptococcal infections. This may be accomplished by (1) early and adequate treatment of streptococcal infections in *all* individuals and (2) prevention of streptococcal infections in *rheumatic* subjects.

TREATMENT OF STREPTOCOCCAL INFECTIONS IN THE GENERAL POPULATION

Following epidemics and in certain population groups, it has been found that about 3 per cent of untreated streptococcal infections are followed by rheumatic fever. Adequate and early penicillin treatment, however, will eliminate streptococci from the throat and prevent most attacks of rheumatic fever.

Diagnosis of Streptococcal Infection

In some instances streptococcal infections can be recognized by their clinical manifestations. *In many patients, however, it is impossible to determine the streptococcal nature of a respiratory infection without obtaining throat cultures.* The following

section on diagnosis has been included in order to assist physicians in making a positive diagnosis and assuring adequate treatment.

The accurate recognition of individual streptococcal infections, their adequate treatment and the control of epidemics in the community presently offer the best means of preventing initial attacks of rheumatic fever.

Common Symptoms

- Sore throat—sudden onset, pain on swallowing.
- Headache—common.
- Fever—variable, but generally from 101° to 104° F.
- Abdominal pain—common, especially in children; less common in adults.
- Nausea and vomiting—common, especially in children.

Common Signs

- Red throat.
- Exudate—usually present.
- Glands—swollen, tender lymph nodes at angle of jaw.
- Rash—scarlatiniform.
- Acute otitis media } frequently due to
- Acute sinusitis } the streptococcus.

In the absence of the common symptoms and signs, occurrence of any of the following symptoms is usually not associated with a streptococcal infection: simple coryza; hoarseness; cough.

*This statement was prepared by the Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis appointed by the Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association. The committee is cognizant of the fact that no recommendations of any group can be final at this time. The present approach may not be the eventual solution of the problem of preventing rheumatic fever. Revisions and changes will be made as new knowledge may indicate.

Laboratory Findings

Throat culture* — hemolytic streptococci are almost invariably recovered on culture during acute streptococcal infections.

White blood count—generally over 12,000.

Treatment of Streptococcal Infections

When streptococcal infection is suspected, treatment should be started immediately. Penicillin is the drug of choice. Effective blood levels should be maintained for a *period of ten days* to prevent rheumatic fever by eradicating the streptococci from the throat.

Penicillin may be administered by either intramuscular or oral route. Intramuscular administration is recommended as the method of choice since it ensures adequate blood levels for a sufficient length of time. Oral therapy by contrast is dependent upon the cooperation of the patient.

In the treatment of streptococcal infections in *known rheumatic* subjects, parenteral penicillin should be employed in at least the maximum doses recommended below.

Recommended Treatment Schedules

Intramuscular Penicillin

Benzathine Penicillin G

Children—one intramuscular injection of 600,000 to 900,000 units.

Adults—one intramuscular injection of 900,000 to 1,200,000 units,

or

Procaine Penicillin with Aluminum

Monostearate in Oil

Children—one intramuscular injection of 300,000 units every third day for three doses.

Adults—one intramuscular injection of 600,000 units every third day for three doses.

*An outline of a recommended "Method for Culturing Beta Hemolytic Streptococci from the Throat" may be obtained from local Heart Associations, or the American Heart Association. This outline is based on the chapter on streptococci by Armine T. Wilson, M.D., for the 4th Edition of Diagnostic Procedures and Reagents, to be published by the American Public Health Association. With the permission of the American Public Health Association, full reprints of this chapter will become available on request from the office of the American Heart Association upon publication of the 4th Edition of this reference work (1957).

Oral Antibiotics

To prevent rheumatic fever by eradicating streptococci, therapy must be continued *for the entire ten days* even though the temperature returns to normal and the patient is asymptomatic.

Penicillin

Children and adults—200,000 to 250,000 units three times a day *for a full ten days*.

Other Antibiotics

Broad spectrum antibiotics such as erythromycin and the tetracyclines are useful in patients who are sensitive to penicillin. If given *for ten days*, these antibiotics are probably as effective as *oral* penicillin in the treatment of streptococcal infections but are subject to the same uncertainties of administration by the oral route.

Not Recommended

The following therapy is *not effective* in preventing rheumatic fever when used as treatment for streptococcal infections: sulfonamide drugs; penicillin troches or lozenges.

PREVENTION OF STREPTOCOCCAL INFECTIONS IN RHEUMATIC INDIVIDUALS

Many streptococcal infections occur without producing clinical manifestations. For this reason, prevention of recurrent rheumatic fever must depend on continuous prophylaxis rather than solely on treatment of acute attacks of streptococcal disease.

Recommendations for Prophylaxis

Who should be treated?

In general, all patients who have a **WELL-DOCUMENTED HISTORY** of rheumatic fever or chorea or who show **DEFINITE EVIDENCE** of rheumatic heart disease should be given continuous prophylaxis.

Although recurrent attacks of rheumatic fever occur at any age, the risk of recurrences decreases with the passage of years. Some physicians may wish to make exceptions to instituting prophylaxis in certain of their adult patients, particularly those without heart disease who have had no rheumatic attacks for many years.

How long should prophylaxis be continued?

The risk of acquiring a streptococcal infection and the possibility of rheumatic fever recurrences continue throughout life. It is, therefore, suggested that the safest general procedure is to continue prophylaxis indefinitely.

When should prophylactic treatment be initiated?

Active rheumatic fever: As soon as the diagnosis of rheumatic fever is made or any time thereafter when the patient is first seen. The streptococcus should be eradicated with penicillin (See Treatment Schedules, Page 366) following which the prophylactic regimen is instituted.

Inactive rheumatic fever: In inactive rheumatic fever, prophylaxis should be instituted when the patient is first seen.

Should prophylaxis be continued during the summer?

Yes, continuously. Streptococcal infections can occur at any season although they are more prevalent in the winter.

**Prophylactic Methods—
Intramuscular and Oral**

Oral medication depends on patient cooperation. In most instances, failures of sulfonamide or penicillin prophylaxis occur in patients who fail to ingest the drug regularly. This can be avoided by long-acting depot penicillin given intramuscularly once a month.

Benzathine Penicillin G—Intramuscular

Dosage—1,200,000 units once a month.

Toxic reactions—same types as with oral penicillin (see below), but occur more frequently and tend to be more severe. Some local discomfort usually is experienced.

Sulfadiazine—Oral

This drug has the advantage of being easy to administer, inexpensive and effective. (Other newer sulfonamides are probably as effective.) Although resistant streptococci have appeared during mass prophylaxis in the armed forces, this is rare in civilian populations.

Dosage—from 0.5 to 1.0 gm. once a day. The smaller dose is to be used in children under sixty pounds.

Toxic Reactions—infrequent and usually minor. In any patient being given sulfonamides, consider all rashes and sore throats as possible toxic reactions, especially if they occur in the first eight weeks. In patients on this prophylactic regimen it is hazardous to treat toxic reactions or intercurrent infections with sulfonamides. The chief toxic reactions are:

Skin Eruptions

Morbilliform—continue drug with caution. Urticaria or scarlatiniform rash associated with sore throat or fever—discontinue drug.

Leukopenia

Discontinue if white blood count falls below 4,000 and polynuclear neutrophils below 35 per cent because of possible agranulocytosis, which is often associated with sore throat and a rash. Because of these reactions, weekly white blood counts are advisable for the first two months of prophylaxis. The occurrence of agranulocytosis after eight weeks of continuous prophylaxis with sulfonamides is extremely rare.

Penicillin—Oral

Penicillin has the desirable characteristics of being bactericidal for Group A streptococci and of rarely producing serious toxic reactions. A careful history of allergic reactions and previous response to penicillin should be obtained.

Dosage—200,000 to 250,000 units once or twice a day. The latter is probably more effective.

Toxic Reactions—urticaria and angioneurotic edema. Reactions similar to serum sickness include fever and joint pains and may be mistaken for rheumatic fever.

Although many individuals who have had reactions to penicillin may subsequently be able to tolerate the drug, it is safer not to use penicillin if the reaction has been severe and particularly if angioneurotic edema has occurred.

PROTECTION OF RHEUMATIC FEVER PATIENTS IN HOSPITAL WARDS

Patients with rheumatic fever or rheumatic heart disease are often exposed to increased hazards in hospital wards as the result of contact with streptococcal carriers or patients with active streptococcal infections. Protection of the rheumatic patient is imperative because of the high rate of recurrence of rheumatic fever following streptococcal infection. In addition to the customary precautions employed to prevent cross infections, the following procedures are recommended:

All hospital patients with streptococcal infections should be fully treated by one of the methods outlined in "Recommended Treatment Schedules," Page 366, in order to eliminate streptococci and avoid the carrier state.

Patients admitted with acute rheumatic fever should immediately receive a full course of antibiotic therapy, whether or not streptococci are isolated from the throat. (See "Recommended Treatment Schedules," Page 366.) As soon as the therapeutic course is completed, continuous streptococcal prophylaxis should be instituted. (See "Prophylactic Methods — Intramuscular and Oral," Page 367.)

Patients with inactive rheumatic fever or rheumatic heart disease should be placed on continuous streptococcal prophylaxis on admission to the hospital, or as soon thereafter as the diagnosis is established. (See "Prophylactic Methods — Intramuscular and Oral," Page 367.)

PROPHYLAXIS AGAINST BACTERIAL ENDOCARDITIS

In individuals who have rheumatic or congenital heart disease, bacteria may lodge on the heart valves or other parts of the endocardium, producing bacterial endocarditis. Transient bacteremia which may lead to bacterial endocarditis is known to occur following various surgical procedures, including dental extractions and other dental manipulations which disturb the gums, the removal of tonsils and adenoids, the delivery of pregnant women, and operations on the gastrointestinal or urinary tracts. It is good medical and dental practice to protect patients with rheumatic or congenital heart disease by prophylactic measures.

Recommended Prophylactic Methods

Penicillin is the drug of choice for administration to patients with rheumatic or congenital heart disease undergoing dental manipulations or surgical procedures in the oral cavity.

Although the exact dosage and duration of therapy are somewhat empirical, there is some evidence that for effective prophylaxis reasonably high concentrations of penicillin must be present at the time of the dental procedure. The dosage regimens employed for long-term prophylaxis of rheumatic fever are inadequate for this purpose. High levels of penicillin in the blood over a period of several days are recommended to prevent organisms from lodging in the heart valves during the period of transient bacteremia.

Not only should penicillin prophylaxis be designed to afford maximum protection, but the method must also be practical. In general, the combined oral and parenteral route of administration is preferred. All patients should be instructed to report to their physician or clinic should they develop fever within a month following the operation.

First Choice—Intramuscular and Oral Penicillin Combined

For two days

prior to surgery - 200,000 to 250,000 units
by mouth four times
a day.

On day of surgery - 200,000 to 250,000 units
by mouth four times
a day, and
600,000 units aqueous
penicillin, with
600,000 units procaine
penicillin shortly be-
fore surgery.

For two days

thereafter - 200,000 to 250,000 units
by mouth four times
a day.

Second Choice (if injection is not feasible) —Oral Penicillin

200,000 to 250,000 units four times a day,
beginning two days prior to the surgical
procedure and continued through the day of
surgery or dental procedure and two days
thereafter.

Contraindications

A history of sensitivity to penicillin.

Other Antibiotics

Erythromycin or the broad spectrum antibiotics should be employed as prophylaxis

in patients who are sensitive to penicillin. In those who are undergoing surgery of the urinary or lower gastrointestinal tract, oxytetracycline or chlortetracycline should be administered in full dosage for five days, beginning treatment two days prior to the surgical procedure.

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